HP ProCurve Switch 6400cl Series

Product overview

The HP ProCurve Switch 6400cl Series consists of 6-port 10-GbE stackables with optional 10-GbE add-on modules. Loaded with full Layer 3 features, the 6400cl series switches offer low-cost 10-GbE for high-performance aggregation of clusters of Gigabit switches. Ideal for consolidating multiple wiring closets, the 6400cl series offers the highest bandwidth on the market today for Gigabit. The ProCurve Switch 6400cl Series also provides fiber flexibility to connect remote campuses up to 40 km away.

Key features

- Distribution layer
- Layer 2 - Layer 4 feature set
- High performance
- Low-cost 10-GbE connectivity

Features and benefits

Industry-leading warranty

Performance

- **160 Gbps backplane with 119 mpps:** unprecedented bandwidth for low-latency throughput
- **Selectable queuing configurations:** increase performance by selecting the queuing configuration that best meets the requirements of network applications
- **Jumbo frames:** on Gigabit and 10-Gigabit ports, allow high-performance remote backup and disaster-recovery services

Resiliency and high availability

- **Router redundancy (XRRP):** allows groups of two routers to dynamically back each other up to create highly available routed environments
- **IEEE 802.3ad Link Aggregation Control Protocol (LACP) and ProCurve trunking:** support up to four trunks, each with up to four links (ports) per trunk; trunking across modules is supported
- **IEEE 802.1s Multiple Spanning Tree:** provides high link availability in multiple VLAN environments by allowing multiple spanning trees
- **IEEE 802.1w Rapid Convergence Spanning Tree Protocol:** increases network uptime through faster recovery from failed links
- **Optional redundant power supply:** provides uninterrupted power (provided by HP ProCurve 600 RPS/EPS)

Manageability

- **sFlow (RFC 3176):** wire-speed traffic accounting and monitoring
- **RMON and XRMON:** provide advanced monitoring and reporting capabilities for statistics, history, alarms, and events
- **Stacking capability:** single IP address management for a virtual stack of up to 16 switches, including the 3400cl series

Layer 2 switching

- **ProCurve switch meshing:** dynamically load-balances across multiple active redundant links to increase available aggregate bandwidth
- **VLAN support and tagging:** supports the IEEE 802.1Q (4,094 VLAN IDs) and 256 VLANs simultaneously
- **GARP VLAN Registration Protocol:** allows automatic learning and dynamic assignment of VLANs
- **IEEE 802.1v protocol VLANs:** isolate select non-IPv4 protocols automatically into their own VLANs

Layer 3 routing

- **Layer 3 IP routing:** provides routing of IP at media speed; supports static routes, RIP, RIPv2, and OSPF

Security

- **Access control lists (ACLs):** provide IP Layer 3 filtering based on source/destination IP address/subnet and source/destination TCP/UDP port number
- **Source-port filtering:** allows only specified ports to communicate with each other
- **RADIUS/TACACS+:** eases switch management security administration by using a password authentication server
- **Secure Shell (SSHv2):** encrypts all transmitted data for secure, remote command-line interface (CLI) access over IP networks
- **Secure Sockets Layer (SSL):** encrypts all HTTP traffic, allowing secure access to the browser-based management GUI in the switch
- **IEEE 802.1X and RADIUS network login:** control port-based access for authentication and accountability
- **Port security:** allows access only to specified MAC addresses, which can be learned or specified by the administrator

♦ For as long as you own the product, with next-business-day advance replacement (available in most countries). The following hardware products and their related series modules have a one-year hardware warranty with extensions available: HP ProCurve Routing Switch 9300m Series, HP ProCurve Switch 8100fl Series, HP ProCurve Network Access Controller 800, and HP ProCurve DCM Controller. The following hardware mobility products have a one-year hardware warranty with extensions available: HP ProCurve M111 Client Bridge, HP ProCurve MSM3xx-R Access Points, HP ProCurve MSM7xx Mobility and Access Controllers, HP ProCurve RF Manager IDS/IPS Systems, HP ProCurve MSM Power Supplies, HP ProCurve 1-Port Power Injector, and HP ProCurve CNMS Appliances. Disk drives in the HP ProCurve ONE Services zl Modules have a five year hardware warranty. Standalone software, upgrades, or licenses may have a different warranty duration. For details, refer to the ProCurve Software License, Warranty, and Support booklet at www.procurve.com/warranty.

- **Web-based authentication:** similar to IEEE 802.1X, provides a browser-based environment to authenticate clients that do not support the IEEE 802.1X supplicant
- **Secure FTP:** allows secure file transfer to/from the switch; protects against unwanted file downloads or unauthorized copying of switch configuration file
- **Secure access to manage the 6400cl series:** all access methods–CLI, GUI, or MIB–are securely encrypted through SSHv2, SSL, and/or SNMPv3

Convergence

- **IP multicast snooping and data-driven IGMP:** automatically prevents flooding of IP multicast traffic

Quality of Service (QoS)

- **Rate limiting:** per-port ingress enforced maximums
- **Layer 4 prioritization:** enables prioritization based on TCP/UDP ports
- **Traffic prioritization (IEEE 802.1p):** allows real-time traffic classification into eight priority levels mapped to eight queues
- **Class of Service (CoS):** sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), L3 protocol, TCP/UDP port number, source port, and DiffServ

Warranty and support

- **ProCurve Lifetime Warranty:** for as long as you own the product, with next-business-day advance replacement (available in most countries).
- **Electronic and telephone support:** limited electronic and telephone support is available from HP. Refer to the HP Web site at www.procurve.com/support for details on the support provided and the period during which support is available.
- **Software releases:** refer to the HP Web site at www.procurve.com/support for details on the software releases provided and the period during which software releases are available.

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Specifications

	HP ProCurve Switch 6400cl (J8433A)	HP ProCurve Switch 6410cl (J8474A)
Ports	6 CX4 10-GbE ports (IEEE 802.3ak Type 10Gbase-CX4); Duplex: full only 1 RS-232C DB-9 console port Supports a maximum of 8 10-GbE ports	6 open 10-GbE X2 transceiver slots 1 RS-232C DB-9 console port Supports a maximum of 8 10-GbE ports
Cabling		
	CX4 ports Maximum distance: • 0.5 m to 15 m using CX4 cable • Up to 300 m using J8439A media converter using MMF	X2 transceiver slots HP ProCurve 10-GbE X2-SC LR Optic Maximum distance: • 9/125 µm single-mode cable = 2-10 km HP ProCurve 10-GbE X2-SC SR Optic Maximum distance: • 62.5 µm multimode cable @ 160 MHz/km = 2-26 meters • 62.5 µm multimode cable @ 200 MHz/km = 2-33 meters • 50 µm multimode cable @ 400 MHz/km = 2-66 meters • 50 µm multimode cable @ 500 MHz/km = 2-82 meters • 50 µm multimode cable @ 2000 MHz/km = 2-300 meters HP ProCurve 10-GbE X2-SC ER Optic Maximum distance: • 30 km (40 km using engineered link) HP ProCurve 10-GbE X2-CX4 Transceiver Maximum distance: • 0.5 m to 15 m using CX4 cable • Up to 300 m using J8439A media converter using MMF
Physical characteristics		
Dimensions	16.9(d) x 17.4(w) x 1.7(h) in. (42.93 x 44.2 x 4.32 cm) (1U height)	16.9(d) x 17.4(w) x 1.7(h) in. (42.93 x 44.2 x 4.32 cm) (1U height)
Weight	12.35 lb. (5.60 kg)	13.56 lb. (6.15 kg)
Memory and processor		
Processor	Motorola PowerPC MPC8245 @ 266 MHz, 16 MB flash, 128 MB SDRAM; packet buffer size: 4 MB	Motorola PowerPC MPC8245 @ 266 MHz, 16 MB flash, 128 MB SDRAM; packet buffer size: 4 MB
Mounting	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance		
Latency	< 11.7 µs (LIFO 64-byte packets)	< 11.7 µs (LIFO 64-byte packets)
Throughput	up to 119 million pps (64-byte packets)	up to 119 million pps (64-byte packets)
Routing/Switching capacity	160 Gbps	160 Gbps
MAC address table size	16,000 entries	16,000 entries
Environment		
Operating temperature	32°F to 131°F (0°C to 55°C); 104°F (40°C) when used with SR/LR/ER optics	32°F to 131°F (0°C to 55°C); 104°F (40°C) when used with SR/LR/ER optics
Operating relative humidity	15% to 95% @ 104°F (40°C), non-condensing	15% to 95% @ 104°F (40°C), non-condensing
Non-operating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Non-operating/Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing	15% to 95% @ 149°F (65°C), non-condensing
Altitude	up to 15,000 ft. (4.6 km)	up to 15,000 ft. (4.6 km)
Acoustic	Power: 55 dB; DIN 45635T.19 per ISO 7779 @ < 77°F (25°C)	Power: 55 dB; DIN 45635T.19 per ISO 7779 @ < 77°F (25°C)
Electrical characteristics		
Maximum heat dissipation	383 BTU/hr (404 kJ/hr), including use of optional cl modules with optics	383 BTU/hr (404 kJ/hr), including use of optional cl modules with optics
Voltage	100-127 / 200-240 VAC	100-127 / 200-240 VAC
Current	3 / 1.5 A	3 / 1.5 A
Power consumption	112 W	120 W
Frequency	50 / 60 Hz	50 / 60 Hz
Notes	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.
Safety	CSA 22.2 No. 60950; EN 60950/IEC 60950; UL 60950	CSA 22.2 No. 60950; EN 60950/IEC 60950; UL 60950
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity		
EN	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz

Specifications (continued)

	HP ProCurve Switch 6400cl (J8433A)	HP ProCurve Switch 6410cl (J8474A)
Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UA438E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UA439E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UA440E) 3-year, 24x7 SW phone support, software updates (UF791E) Installation with minimum configuration, system-based pricing (U4826E) Installation with HP-provided configuration, system-based pricing (U4830E) Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	3-year, 4-hour onsite, 13x5 coverage for hardware (UA438E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UA439E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UA440E) 3-year, 24x7 SW phone support, software updates (UF791E) Installation with minimum configuration, system-based pricing (U4826E) Installation with HP-provided configuration, system-based pricing (U4830E) Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

Standards and protocols
(applies to all products in series)

Device management
HTML and telnet management

General protocols
IEEE 802.1D MAC Bridges
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1v VLAN classification by Protocol and Port
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3ae 10-Gigabit Ethernet
IEEE 802.3ak 10GBASE-CX4
IEEE 802.3x Flow Control
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 TELNET
RFC 951 BOOTP
RFC 1058 RIPv1
RFC 1542 BOOTP Extensions
RFC 2030 Simple Network Time Protocol (SNTP) v4
RFC 2131 DHCP
RFC 2453 RIPv2
RFC 3046 DHCP Relay Agent Information Option

IP multicast
RFC 3376 IGMPv3

MIBs
RFC 1213 MIB II
RFC 1493 Bridge MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 2096 IP Forwarding Table MIB
RFC 2618 RADIUS Client MIB
RFC 2620 RADIUS Accounting MIB
RFC 2665 Ethernet-Like-MIB
RFC 2668 802.3 MAU MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2863 The Interfaces Group MIB

Network management
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 3164 BSD syslog Protocol
RFC 3176 sFlow
SNMPv1/v2c/v3
XRMON

OSPF
RFC 2328 OSPFv2

QoS/Cos
RFC 2474 DiffServ Precedence, including 8 queues/port
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)

Security
IEEE 802.1X Port Based Network Access Control
RFC 1492 TACACS+
RFC 2138 RADIUS Authentication
RFC 2866 RADIUS Accounting
Secure Sockets Layer (SSL)
SSHv1/SSHv2 Secure Shell

HP ProCurve Switch 6400cl Series accessories

HP ProCurve 10-GbE X2-CX4 Transceiver (J8440B)
HP ProCurve 10-GbE CX4 Media Converter (J8439A)
HP ProCurve 10-GbE X2-SC SR Optic (J8436A)
HP ProCurve 10-GbE X2-SC LR Optic (J8437A)
HP ProCurve 10-GbE X2-SC ER Optic (J8438A)
HP ProCurve 600 Redundant External Power Supply (J8168A)
HP ProCurve Network Immunity Manager 1.0 50-device license (J9060A)
HP ProCurve Network Immunity Manager 1.0 +100-device license (J9061A)
HP ProCurve Network Immunity Manager 1.0 unlimited-device license (J9062A)
HP ProCurve Manager 2.3 (-)

cl Modules

HP ProCurve Switch cl 10-GbE Media Flex Module (J8435A)
HP ProCurve Switch cl 10-GbE CX4 Copper Module (J8434A)

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To learn more, visit www.hp.com/go/procurve

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